

Unification of Gravity and Electromagnetism: On How the Unified Force Arises From Local Anisotropies in the Dynamic Ether

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Abstract. There is mounting empirical and observational evidence that not all is well with the currently dominant paradigm for gravity: Einstein's general theory of relativity, which in the limit of low field is consistent with Newton's force of gravity. Difficulties started about eighty years ago when Zwicky discovered that remote stars, galaxies and clusters of galaxies move faster than expected per Newtonian gravity. The inconsistency was fixed with the invention of a non-observable dark matter —which seems to be just a modern revival of ether with properties suitable for the required mending. Around 1985 Fischbach and collaborators discovered that the results of the experiment carried out by Eötvös, Pekár and Fekete in the 1890s were not null; rather the passive gravitational mass systematically varied as a function of chemical composition, thus leaving without empirical support Einstein's principle of equivalence. Several minor difficulties also appeared during the past fifty years, as artificial satellite anomalies, eclipse anomalies, and so on. The situation worsened towards the end of the 20th century when it was realized that the value of Newton's *universal* gravitational constant G_N is not unique, instead it depends on the method used for its determination. For instance, in geophysical setups G_N seems to be larger than at laboratory scale, the latter seems to be a touchy issue because the Particle Data Group (PDG) carefully noted in 2012 that "*absolute lab measurements of G_N have been made only on scales of about 1 cm to 1 m.*" Then, there is room to search for some alternative approaches to gravity that might work. Newton firmly believed that the concept of ether was needed to explain the propagation of gravity, but refrained of doing so claiming that "*hypotheses non fingo*"; this paper explores the path that Newton did not take. The possibility that gravity can be described by equations similar to those of electromagnetism (EM) was mentioned by Faraday, and afterwards by Heavyside, who published a little known paper by the end of the 19th century. It is well known that for developing his equations for EM Maxwell was guided by the equations for the transport of fluids. During the last decade of the 20th century several writers, including the present author, proposed various models for an etheric fluid, and from there Maxwell's equations were recovered. The present paper proposes a photonic ether that solves several philosophical concerns and physical limitations that are present in an ether formed by material particles. A rigorous consideration of a classical collision allows identification of the primigenial breaking of symmetry; collision mechanisms eventually leading to local agglomeration of matter are also identified. Following LeSage, such local anisotropies induce an imbalance in the pressure associated with the photonic flow, imbalance that at large scales is perceived as gravity. The present author has already proposed elsewhere an atomic-type LeSagian gravity, which solves all the difficulties faced by the current paradigm. Unification with EM is automatic because LeSagian gravity is based on a fluid. Furthermore, the strength of our LeSagian interaction depends on $(\alpha A + \beta Z)$, where Z and A are the atomic number and the atomic mass, and the only adjustable parameters are α and β ; such dependence has the right signature in the context of the standard model.